WHAT IS CLAIMED IS:

1. A digital watermark detection method of detecting watermark information embedded in an input image signal, comprising:

reducing an image size of the input image signal to generate a size-reduced image signal; and

detecting the watermark information in the size-reduced image signal.

2. A digital watermark detection apparatus to detect watermark information embedded in an input image signal, comprising:

an image-size-reduction unit configured to reduce an image size of the input image signal and generate a size-reduced image signal; and

a detector to detect the watermark information in the size-reduced image signal.

3. The digital watermark detection apparatus according to claim 2, wherein the detector includes:

an extraction unit configured to extract a specific frequency component signal from the size-reduced image signal;

a phase controller to control a phase of the specific frequency component signal;

a correlator to compute a cross-correlation value between the phase-controlled specific frequency component signal and the size-reduced image signal; and

an estimation unit configured to estimate the

watermark information from the cross-correlation value.

4. The digital watermark detection apparatus according to claim 3, wherein the estimation unit estimates the watermark information by detecting a peak in the cross-correlation value.

5. The digital watermark detection apparatus according to claim 2, wherein the detector includes:

a correlator to compute an auto-correlation function of the size-reduced image signal;

an extraction unit configured to extract a specific frequency component signal by filtering the auto-correlation function; and

an estimation unit configured to estimate the watermark information from the specific frequency component signal.

6. The digital watermark detection apparatus according to claim 5, wherein the correlator includes a controller which controls a phase of the size-reduced image signal to generate a phase-controlled image signal, the correlator computing, as the auto-correlation function, a correlation value between the phase-controlled image signal and the size-reduced image signal.

7. The digital watermark detection apparatus according to claim 5, wherein the correlator computes the auto-correlation function based on a result obtained by down-sampling pixel values of the input

image signal.

8. The digital watermark detection apparatus according to claim 5, wherein the estimation unit estimates the watermark information by determining a polarity of a peak of the specific frequency component signal.

9. The digital watermark detection apparatus according to claim 2, wherein the detector includes:

a correlator which computes an auto-correlation function of the size-reduced image signal;

a first accumulator which accumulates the auto-correlation function for a first period of time to generate a first accumulation signal;

an extraction unit configured to extract a specific frequency component signal from the first accumulation signal;

a normalizing unit configured to normalize an amplitude of the specific frequency component signal;

a second accumulator which accumulates the normalized specific frequency component signal for a second period of time longer than the first period of time to generate a second accumulation signal; and

an estimation unit configured to estimate the watermark information from the second accumulation signal.

10. The digital watermark detection apparatus according to claim 9, wherein the correlator includes a

controller which controls a phase of the size-reduced image signal to generate a phase-controlled image signal, the correlator computing, as the auto-correlation function, a correlation value between the phase-controlled image signal and the size-reduced image signal.

11. The digital watermark detection apparatus according to claim 9, wherein the correlator computes the auto-correlation function based on a result obtained by down-sampling pixel values of the input image signal.

12. The digital watermark detection apparatus according to claim 2, wherein the estimation unit detects the watermark information using at least first and second detection manners, the estimation unit determining that the watermark information is embedded, if the detection results are coincide to each other.

13. The digital watermark detection apparatus according to claim 5, wherein the correlator includes a processor, and which further comprises a controller to control an operation amount of the correlator per unit time in accordance with a throughput of the processor.

14. The digital watermark detection apparatus according to claim 9, wherein at least one of the correlator, the first accumulator, the extraction unit, the normalizing unit and the second accumulator includes a processor, and which further comprises a

controller to control an operation amount of the correlator per unit time in accordance with a throughput of the processor.

15. The digital watermark detection apparatus according to claim 13, wherein the controller periodically stops computation of the correlator to reduce the operation amount, if the throughput is lower than a threshold value.

16. The digital watermark detection apparatus according to claim 14, wherein the controller periodically stops computation of the correlator, and elongates the second period of time.

17. The digital watermark detection apparatus according to claim 2, further comprising an image rotation unit located before the detector and configured to perform an image rotation operation on the size-reduced image signal.

18. The digital watermark detection apparatus according to claim 17, wherein the image rotation unit comprises a line buffer to read a plurality of line components of the size-reduced image signal at a time and temporarily accumulates them, and a read unit configured to read the accumulated line components with reading portions of the line components being shifted to one another, and to supply the read line components to the correlator.

19. The digital watermark detection apparatus

according to claim 18, wherein the read unit shifts the reading portions of the line component in units of a given number of pixels of the input image signal.

20. The digital watermark detection apparatus according to claim 9, wherein the estimation unit estimates a level of the second accumulation signal, by performing a determination using a threshold value changed in accordance with the second accumulation period of time.

21. The digital watermark detection apparatus according to claim 9, further comprising a third accumulator which accumulates the normalized specific frequency component signal for a third period of time longer than the first period of time and shorter than the second period of time, to generate a third accumulation signal, and wherein the estimation unit provisionally detects the watermark information from the third accumulation signal a given number of times to obtain a plurality of provisional detection results, the estimation unit determining that the detection results based on the second accumulation signal is valid, if more than half of the provisional detection results are coincide.

22. The digital watermark detection apparatus according to claim 2, wherein the size-reduced image signal has a particular reduction ratio with respect to the input image signal, and the specific frequency

component signal has a frequency corresponding to the particular reduction ratio of the size-reduced image signal.

23. The digital watermark detection apparatus according to claim 2, wherein the input image signal has a particular resolution, and the image-size-reduction unit performs image size reduction by reducing the resolution of the input image signal.

24. A digital watermark detection apparatus to detect watermark information embedded in an input image signal, based on a size-reduced image signal received from an external device, the external device receiving the input image signal and reducing an image size of the received input image signal to generate the size-reduced image signal, the digital watermark detection apparatus comprising:

an extraction unit configured to extract a specific frequency component signal from the size-reduced image signal;

a phase controller to control a phase of the specific frequency component signal;

a correlator to compute a cross-correlation value between the phase-controlled specific frequency component signal and the size-reduced image signal; and

an estimation unit configured to estimate the watermark information from the cross-correlation value.

25. A digital watermark detection apparatus to

detect watermark information embedded in an input image signal, based on a size-reduced image signal received from an external device, the external device receiving the input image signal and reducing an image size of the received input image signal, thereby generating the size-reduced image signal, the digital watermark detection apparatus comprising:

a correlator to compute an auto-correlation function of the size-reduced image signal;

an extraction unit configured to extract a specific frequency component signal by filtering the auto-correlation function; and

an estimation unit configured to estimate the watermark information from the specific frequency component signal.

26. A digital watermark detection apparatus to detect watermark information embedded in an input image signal, based on a size-reduced image signal received from an external device, the external device receiving the input image signal and reducing an image size of the received input image signal, thereby generating the size-reduced image signal, the digital watermark detection apparatus comprising:

a correlator to compute an auto-correlation function of the size-reduced image signal;

a first accumulator to accumulate the auto-correlation function for a first period of time to

generate a first accumulation signal;

an extraction unit configured to extract a specific frequency component signal from the first accumulation signal;

a normalizing unit configured to normalize an amplitude of the specific frequency component signal;

a second accumulator which accumulates the normalized specific frequency component signal for a second period of time longer than the first period of time to generate a second accumulation signal; and

an estimation unit configured to estimate the watermark information from the second accumulation signal.

27. The digital watermark detection apparatus according to claim 2, wherein the input image signal is a high definition image signal, and the size-reduced image signal is a standard definition image signal.